

WHAT IS CLAIMED IS:

1 1. A method of testing a firewall comprising:
2 transmitting at least one of a session initiation
3 signal to initiate a communications session through said
4 firewall and a session termination signal used to
5 termination an established communications session; and
6 monitoring to determine from the time of at least one
7 transmitted signal at least one of a port opening delay
8 which occurs in regard to opening a port in said firewall
9 for a communications session that is being initiated and a
10 port closing delay which occurs in regard to closing a port
11 in said firewall when terminating an established
12 communications session.

1 2. The method of claim 1, further comprising:
2 transmitting session signals at an increasing rate
3 through said firewall to cause at least one of the opening
4 and closing of ports in said firewall; and
5 measuring the effect of said increasing rate of
6 session signals on at least one of an opening and a closing
7 delay time associated with opening a port and closing a
8 port, respectively, in response to transmitted session
9 signals.

1 3. The method according to claim 1, wherein said at least
2 one of a port opening delay and a port closing delay is a
3 port closing delay.

1 4. The method of claim 3, further comprising:
2 transmitting session signals at an increasing rate

3 through said firewall to cause at least one of the opening
4 and closing of ports in said firewall; and
5 measuring the effect of said increasing rate of
6 session signals on at least one of an opening and a closing
7 delay time associated with opening a port and closing a
8 port, respectively, in response to said session signals.

1 5. The method of claim 4, further comprising:
2 determining an average closing delay for each of a
3 plurality of different session signaling rates.

1 6. The method of claim 5, further comprising:
2 generating a visual display of a graph illustrating
3 the average closing delay for a plurality of different
4 session signaling rates.

1 7. A method of testing a network firewall comprising:
2 transmitting a session signal to terminate an ongoing
3 communications session being conducted through at least one
4 port of said firewall; and
5 measuring a port closing delay time associated with
6 the closing of said at least one port following the
7 transmission of said signal to terminate said
8 communications session.

1 8. The method of claim 7, wherein said port closing delay
2 is a time period which occurs between the time a signal
3 used to cause the closing of the port is detected and said
4 port ceases to allow communications signals to pass through
5 from the first side of said firewall to the second side of
6 said firewall.

1 9. The method according to claim 8, further comprising
2 the steps of:

3 transmitting test signals at said port prior to the
4 closing of said port; and
5 monitoring the port to determine when said test
6 signals cease passing through said port.

1 10. The method of claim 7, further comprising:
2 repeating said initiating transmitting and measuring
3 steps while increasing a rate of session signals sent to
4 said firewall to load said firewall; and
5 monitoring changes in port closing delay times in
6 response to said increasing rate of session signals to
7 determine effect of increasing levels of session signaling
8 on closing delay times.

1 11. The method of claim 10, further comprising:
2 determining the level of session signaling that causes
3 a closing delay time which exceeds a preselected maximum
4 closing delay time.

1 12. The method of claim 10, further comprising:
2 determining the amount of firewall processing power
3 required for a particular application based on an expected
4 traffic load and said monitored information indicating the
5 effect of session signaling of different loads on said
6 closing delay.

1 13. The method of claim 7, wherein said session signal is
2 at least one of SIP and H.323 compliant signals.

1 14. A method of testing a network firewall, comprising:
2 transmitting a session signal to initiate a
3 communications session to be conducted through said
4 firewall;

5 transmitting test signals to at least one port on a
6 first side of said firewall;

7 determining a time when said test signals first pass
8 through said at least one port, said at least one port
9 being opened in response to said signal to initiate a
10 communications session; and

11 determining a port opening delay which occurs in
12 regard to opening a port in said firewall for said
13 communications session from said determined time.

1 15. The method of claim 14, wherein said port opening
2 delay is a time period which occurs between a time a signal
3 used to cause the port for said communications session to
4 open is detected and said port allows a signal to pass
5 through from the first side of said firewall to the second
6 side of said firewall.

1 16. The method according to claim 15, further comprising
2 the step of:

3 transmitting another session signal to terminate said
4 communications session; and

5 monitoring a port closing delay time corresponding to
6 a port closing delay which occurs in regard to closing the
7 port in said firewall that was opened for said
8 communications session.

1 17. The method of claim 16, wherein said port closing
2 delay is a time period which occurs between the time a

3 signal used to cause the closing of the port is detected
4 and said port ceases to allow communications signals to
5 pass through from the first side of said firewall to the
6 second side of said firewall.

1 18. The method of claim 14, further comprising the steps
2 of:

3 transmitting session signals at an increasing rate
4 through said firewall to cause at least one of the opening
5 and closing of ports in said firewall; and

6 measuring the effect of said increasing rate of
7 session signals on at least one of an opening and closing
8 delay time associated with opening and closing ports,
9 respectively, in response to said session signals.

1 19. The method of claim 18, wherein said session signals
2 are at least one of SIP and H.323 compliant signals.

1 20. A firewall test apparatus, comprising:

2 a session signaling module for generating session
3 signals used to initiate a communications session to be
4 conducted through a firewall to be tested and to terminate
5 a communications session after it has been initiated;

6 a scanning probe generation module for generating
7 probe signals to be directed at firewall ports;

8 a timing synchronization module for synchronizing
9 operation of said firewall test apparatus to at least one
10 of an external clock source and another firewall test
11 apparatus; and

12 an analysis module for determining at least a port
13 closing delay from a session signal time and a time probe
14 signals are detected to stop passing through a port in said

15 firewall corresponding to an initiated communications
16 session.

1 21. The firewall test apparatus of claim 20, wherein said
2 analysis module further includes means for determining at
3 least a port opening delay from a session signal time
4 associated with a session signal used to initiate a
5 communications session and a time probe signals are
6 detected to start passing through a port in said firewall
7 corresponding to the initiated communications session.

1 22. The firewall test apparatus of claim 21, wherein said
2 session signaling module includes means for flooding said
3 firewall with increasing amounts of session signal traffic
4 used to initiate and terminate communications sessions.

1 23. The firewall test apparatus of claim 22, wherein said
2 analysis module includes:

3 means for determining the effect of increasing amount
4 of session signaling flooding said firewall on the closing
5 delays associated with terminating existing communications
6 sessions.

1 24. The firewall test apparatus of claim 23, further
2 comprising:

3 an output device for outputting a report showing the
4 effect of flooding said firewall with increasing amounts of
5 session signals on the closing delays associated with
6 terminating existing communications sessions.

1 25. A firewall test system for testing a firewall,

2 comprising;

3 a test signal generator for generating communications
4 session initiation signals and probe signals directed at a
5 first side of said firewall; and

6 a test signal analyzer for detecting probe signals
7 passing through said first side of said firewall to said
8 second side of said firewall and for determining port
9 closing delays as measured from the time the test signal
10 analyzer detects a signal used to close a port in said
11 firewall and said analyzer ceases to detect test signals
12 passing through said firewall.

1 26. The firewall test system of claim 25, wherein said
2 test signal generator further includes:

3 means for establishing a communications session
4 through said firewall using session initiation signals
5 prior to transmitting at least some of said probe signals.

1 27. The firewall test system of claim 26,
2 wherein said test signal generator includes means for
3 synchronizing test signal generation to an outside clock
4 source; and

5 wherein said signal analyzer includes means for
6 synchronizing device operation with said outside clock
7 source.

1 28. The firewall test system of claim 27, wherein said
2 test signal generator includes means for flooding said
3 firewall with session signals which trigger the opening or
4 the closing of ports in said firewall.

1 29. The firewall test system of claim 28, wherein said

2 test analyzer further includes:

3 means for measuring the effect of increasing the rate
4 of session signals on port closing times following the
5 termination of a communications session.

1 30. A method of testing a firewall, comprising the steps
2 of:

3 transmitting session signals used to control at least
4 one of the establishment and termination of communications
5 sessions through said firewall at an increasing rate; and
6 measuring the effect of the increasing rate of session
7 signals on port closing delays associated with the
8 termination of communications sessions through said
9 firewall.

1 31. The method of claim 30, further comprising;
2 determining the session signal rate which results in a
3 maximum acceptable port closing delay being exceeded.

1 32. The method of claim 31, wherein said transmitted
2 session signals are at least one of SIP signals and H.323
3 signals.